Geochemistry of Cretaceous hydromagmatic lava flows in Separdeh district, NE Qazvin, central Alborz

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Abstract: The alkaline and stratoid volcanic rocks of Separdeh district (NE Qazvin), located on the central Albroz zone, are underlain conformably by Early Cretaceous limestones of Tizkuh Formation. These rocks are texturally homogenous and very fine-grained and characterized by microphenocrysts and microliths of plagioclase, pyroxene, olivine, apatite and opaque set in a hyaline matrix. However, few pyroclastic deposits with the following characteristics are found amongst them: patchy fabric, mafic micropillows, relative high vesicularity (3-4 times of lava flows), segregation vesicles, pumiceous clasts and glassy shards. So, in contrary with the effusive lava flows, it can be concluded that they were formed by more explosive eruptions. The samples are tephreric in chemical composition and belonged to the sodic alkaline suite. Although the effusive samples have a similar chemical composition, the pyroclastic samples show higher contents of silica and alkalis and lower amounts of TiO2, Fe2O3, MgO and CaO than the effusive lava flows. Also, most samples show an enrichment (about 100 times) of LREEs relative to HREEs, positive anomaly of HFSEs, Th, Rb and Eu, negative anomaly of Ta and K and also no anomaly of Ti and Nb. Moreover, they set in the continental rift setting and show an enriched garnet lherzolite source in the petrogenetic plots. As a result, it can be stated that the parental magma originated from an enriched asthenospheric mantle were effusively erupted in a deep submarine basin through the fissures of an extensional regime (or continental rift setting) during Late Cretaceous times. However, the more acidic magma could be produced by partial melting of lithosphere due to invading of the mantle mafic magma. Sometimes, the styles of eruptions were changed into the more explosive activities by mixing of two magmas intensified by contact with water.

Keywords: Submarine eruptions; continental rift; Cretaceous; Central Alborz; Qazvin.